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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/915,188	07/25/2001	John C. Dute	A-70825/RMA	5259

1678 7590 02/12/2004

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EXAMINER	
PEREZ DAPLE, AARON C	

ART UNIT	PAPER NUMBER
2121	12

DATE MAILED: 02/12/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/915,188	DUTE ET AL.	
	Examiner	Art Unit	
	Aaron Perez-Daple	2121	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *23 December 2003*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-3,5-7,9-75 and 77-81* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-3,5-7,9-75 and 77-81* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

1. This Action is in response to Amendment filed 12/23/03, which has been fully considered.

2. Newly amended claims 1-3, 5-7, 9-75 and 77-82 are presented for examination.

3. Claims 4, 8 and 76 are cancelled by Applicant.

4. This Action is made FINAL.

Response to Arguments

Claim Objections

5. Objections to claims 2-81, 40, 58, 41, 59 and 76 are withdrawn in view of Applicant's Amendment.

112 Rejections

6. The rejection of claim 17 under 35 U.S.C. 112, second paragraph, is withdrawn in view of Applicant's Amendment.

Prior Art Rejections

7. Applicant's arguments with respect to claims 1-82 have been considered but are moot in view of the new ground(s) of rejection.

Claim Rejections - 35 USC § 103

8. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

9. **Claims 1-3, 5, 45-48, 64 and 65** are rejected under 35 U.S.C. 103(a) as being obvious over Diekhans et al (US 5,043,861) (hereinafter Diekhans) in view of Sitte (US 5,469,150) (hereinafter Sitte).

10. As for claims 1 and 45, Diekhans discloses a comprehensive input/output interface circuit for interfacing a process or machine controller with a sensor monitoring a condition within said process or machine or an actuator acting to modify said process or machine with a controller receiving inputs from said sensor or sending commands to said actuator [col. 1, lines 7-20, "The invention relates...the output contacts."]; said interface comprising:

first and second electrical terminals for coupling with said sensor or said actuator [the terminals are inherent to the common plug; col. 2, lines 7-11, "The contacts, sensors...input/output circuit board."];

a plurality of operation mode circuits providing different signal type input and output functions including a digital input function, a digital output function, an analog input function, and an analog output function [col. 1, lines 7-20, "The invention relates...the output contacts."]; and

means for the controlling activation and deactivation of different ones of said operation mode circuits to provide a selected ones of said signal type input and output functions [col. 2, lines 10-18, "Drive of the input and output...during multiplex operation."].

Although obvious to one of ordinary skill in the art, Diekhans does not explicitly disclose coupling with a sensor or actuator exclusively through only said first and second electronic terminals. Sitte teaches a sensor having two terminals [col. 1, lines 39-54, "U.S. Pat No....over a wide range."]. Such a sensor would inherently be coupled to a control circuit through only two terminals (e.g. first and second terminals). Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to modify Diekhans by coupling with a sensor or actuator exclusively through only said first and second electronic terminals, because this would allow for coupling with a two-terminal sensor such as that disclosed by Sitte.

11. As for claims 2 and 46, Diekhans discloses the interface of claims 1 and 45 wherein said means for controlling activation and deactivation includes a microcontroller [col. 1, lines 16-17, "input or output circuits"; col. 2, lines 10-18, "Drive of the input and output...during multiplex operation."].

12. As for claims 3 and 47, Diekhans discloses the interface of claims 2 and 46, wherein said microcontroller is adapted to receive control signals from an external controller [processor CPR, Fig. 1; col. 2, lines 58-66, "Fig. 1 is a general...provided on the processor."].

13. As for claims 5 and 48, Diekhans discloses the interface of claims 1 and 45 wherein said means for controlling activation and deactivation includes a microcontroller that is adapted to receive control signals from an external controller [col. 1, lines 16-17, "input or output circuits"; col. 2, lines 10-18, "Drive of the input and output...during multiplex operation."].

14. As for claim 64, Diekhans discloses the interface of claim 1, further comprising means for controlling current delivered to or drawn by said first external device by providing a

substantially constant current to said first external device [col. 1, line 62 – col. 2, line 6, "The users connected to...input processing is assured."].

15. As for claim 65, Diekhans discloses the interface of claim 64, wherein said first external device comprises an actuator [col. 1, lines 62-63, "The users connected to the outputs...or heat generators...."].

16. **Claims 52 and 54** are rejected under 35 U.S.C. 103(a) as being obvious over Diekhans in view of Sitte and in further view of Johnson (US 5,264,958). As for claims 52 and 54, neither Diekhans nor Sitte specifically disclose the use of a protection circuit. However, Johnson discloses the use of a protection circuit with an interface for reducing damage to said interface and connected devices that could otherwise occur as a result of misconnecting or miswiring said interface to an external device [col. 4, lines 31-43, "Referring now to Fig. 2...from the signals."].

It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the teachings of Diekhans and Sitte by adding a protection circuit for reducing damage to said interface or to said first device or said second device that would otherwise result in damage to said interface as a result of misconnecting or miswiring said interface to one of said first or second external devices, because this would also provide protection from an inordinately high input voltage or a short circuit, as taught by Johnson [col. 4, lines 31-43, "Referring now to Fig. 2...from the signals."].

17. **Claims 56 and 57** are rejected under 35 U.S.C. 103(a) as being obvious over Diekhans in view of Sitte and in further view of McLeish et al (US 5,014,238) (hereinafter McLeish). As for claims 56 and 57, neither Diekhans nor Sitte specifically disclose the use of an input

current detection circuit that detects the state of a sensor directly rather than detecting the sensor voltage. However, McLeish discloses the use of an input current detection circuit that detects the state of a sensor directly rather than detecting the sensor voltage [col. 4, lines 31-43, "Referring now to Fig. 2...from the signals."; col. 5, lines 51-57, "Define the sensor type...-current."]. It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the teachings of Diekhans and Sitte by using an input current detection circuit that detects the state of a sensor directly rather than detecting the sensor voltage, because this would provide for electrical protection from EMI interference and common mode voltage suppression, as taught by McLeish [col. 4, lines 31-43, "Referring now to Fig. 2...from the signals."].

18. **Claims 6, 7, 9-44 and 49-51, 53, 55, 58-62, 79 and 81** are rejected under 35 U.S.C. 103(a) as being anticipated by McLeish et al (US 5,014,238) (hereinafter McLeish) in view of Sitte (US 5,469,150).

19. As for claim 6, McLeish discloses an electrical input and output (I/O) interface comprising:

a first port for coupling said interface to a first external device [col. 4, lines 30-34, "A field device 4...or field device 4."];

a second port for coupling said interface with a second device [col. 4, lines 30-34, "A field device 4...or field device 4."];

an operating circuit communicating with a first signal set at said first port and communicating a second signal set at said second port and performing an operation on one of said first signal set and said second signal set as an input and generating the other one of said

first signal set and said second signal set as an output [col. 4, lines 30-58, "A field device 4...of keyboard 10."; col. 5, lines 25-28, "The input-output device...referred to above."]; and

an operation selector selecting said operation performed by said operating circuit from among a plurality of operations [col. 5, lines 25-68, "The input-output device...base and the span."].

McLeish does not specifically disclose a first port having only first and second terminals for exclusively coupling an interface to a first external device. Sitte teaches a sensor having two terminals [col. 1, lines 39-54, "U.S. Pat No....over a wide range."]. Such a sensor would inherently be coupled to a control circuit through only two terminals (e.g. first and second terminals). Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to modify McLiesh providing a first port with only first and second terminals for exclusively coupling the interface to a first external device, because this would allow for coupling with a two-terminal sensor such as that disclosed by Sitte.

20. As for claim 7, McLeish discloses the interface of claim 6, wherein said interface is a comprehensive universal configurable interface for interfacing a multiplicity of analog, digital, voltage and current based signals over a multiple orders of magnitude signal range between a controller and a transducer [col. 4, lines 30-55, "A field device...referred to above."].

21. As for claims 9-13, McLeish discloses the interface in claim 6, wherein said first external device comprises either a sensor or an actuator of a machine or process and said sensor or actuator are used to monitor or control said machine or process [col. 5, lines 25-68, "The input-output device...base and the span."].

22. As for claim 14, McLeish discloses the interface in claim 6, wherein said first external device comprises a sensor generating a voltage signal [col. 5, lines 51-57, "Define the sensor...-current."].

23. As for claim 15, McLeish discloses the interface in claim 6, wherein said first external device comprises a sensor generating a current signal [col. 5, lines 51-57, "Define the sensor...-current."].

24. As for claim 16, McLeish discloses the interface in claim 6, wherein said second device comprises an external controller [MP 3, Fig. 2].

25. As for claim 17, McLeish discloses the interface in claim 6, wherein said second device consists of a controller and an isolation circuit interposed between said interface and an external controller [col. 5, lines 49-58, "The signal conditioning...of keyboard 10."].

26. As for claims 18-20, McLeish discloses the interface in claim 6, wherein said second port includes a third terminal for communicating data, control or commands, and clock [col. 4, lines 30-55, "A field device...referred to above."].

27. As for claim 21, McLeish does not specifically disclose the use of a fifth terminal. However, McLeish discloses the use of multiple terminals for communicating data, communicating control or commands and for communicating clock [col. 4, lines 30-55, "A field device...referred to above."]. It would have been obvious to one of ordinary skill in the art at the time of the invention to modify McLeish to include five terminals, the third terminal for communicating data, the fourth terminal for communicating control or commands and the fifth terminal for communicating clock, because this is one of several known and obvious design choices.

28. As for claim 22, McLeish discloses the interface in claim 6, wherein said operating circuit including a plurality of different operating mode circuits [col. 4, lines 9-22, "The input-output device...also be utilized."].

29. As for claim 23, McLeish discloses the interface in claim 6, wherein said operating circuit includes means for configuring said operating circuit in a particular mode of operation [col. 5, lines 25-68, "The input-output device...base and the span."].

30. As for claim 24, McLeish discloses the interface in claim 23, wherein said mode of operation selected from the set of operating modes consisting of a digital input signal mode, a digital output signal mode, an analog input signal mode, an analog output signal mode, and combinations thereof [col. 4, lines 30-55, "A field device...referred to above."].

31. As for claim 25, McLeish discloses the interface in claim 23, wherein said mode of operation selected from the set of operating modes consisting of a Mode 1 operating mode, a Mode 2 operating mode, a Mode 3 operating mode, a Mode 4 operating mode, a Mode 5 operating mode, a Mode 6 operating mode, a Mode 7 operating mode, and combinations thereof [col. 5, lines 25-68, "The input-output device...base and the span."].

32. As for claim 26, McLeish discloses the interface in claim 6, wherein said operation selector selects an operating mode from among a plurality of defined modes of operation [col. 5, lines 25-68, "The input-output device...base and the span."].

33. As for claim 27, McLeish discloses the interface in claim 6, wherein said operation selector comprising a microcontroller [col. 4, lines 9-22, "The input-output device...also be utilized."].

34. As for claim 28, McLeish discloses the interface in claim 6, wherein said operation selector comprising a microcontroller coupled with at least one analog-to-digital converter for converting analog signals to digital signals for processing by said microcontroller [col. 1, lines 36-47, "Furthermore, U.S. Pat...and digital signals."]

35. As for claim 29, McLeish discloses the interface in claim 6, wherein said operation selector microcontroller having a plurality of control lines for receiving input signals and a plurality of output signals to influence the operation performed by said operating circuit [Fig. 1; col. 4, lines 30-55, "A field device...referred to above."].

36. As for claim 30, McLeish discloses the interface in claim 6, wherein said plurality of operations including a digital input signal mode, a digital output signal mode, an analog input signal mode, an analog output signal mode, and combinations thereof [col. 4, lines 30-55, "A field device...referred to above."; col. 5, lines 25-68, "The input-output device...base and the span."].

37. As for claim 31, McLeish discloses the interface in claim 6, wherein said plurality of operations including a mode of operation selected from the set of operating modes consisting of a Mode 1 operating mode, a Mode 2 15 operating mode, a Mode 3 operating mode, a Mode 4 operating mode, a Mode 5 operating mode, a Mode 6 operating mode, a Mode 7 operating mode, and combinations thereof [col. 5, lines 25-68, "The input-output device...base and the span."].

38. As for claim 32, McLeish discloses the interface in claim 6, wherein said operation selector is operative to activate portions of said operating circuit and to deactivate portions of said operating circuit to define an active circuit that performs a selected operation [col. 4,

lines 30-55, "A field device...referred to above."; col. 5, lines 25-68, "The input-output device...base and the span."].

39. As for claim 33, McLeish discloses the interface in claim 6, wherein said operating circuit comprises a plurality of modular circuits each for performing a predetermined signal processing function with respect to input signals and output signals, and said operation selector being operative to activate ones of said modules and to deactivate other ones of said modules to define one or more active modules that performs a selected operation [col. 4, lines 9-22, "The input-output device...also be utilized."; col. 5, lines 25-68, "The input-output device...base and the span."].

40. As for claim 34, McLeish discloses the interface in claim 6, wherein said operation selector is operative to activate said modules to process a signal of a particular signal type [col. 4, lines 30-55, "A field device...referred to above."; col. 5, lines 25-68, "The input-output device...base and the span."].

41. As for claim 35, McLeish discloses the interface in claim 6, wherein said particular signal type comprises either an input signal type or an output signal type or both [col. 4, lines 30-55, "A field device...referred to above."].

42. As for claim 36, McLeish discloses the interface in claim 6, wherein said interface communicates an output command to one of said first or second device commanding said external device to operate in a status corresponding to said command; and monitoring the actual operating status of said external device; said actual operating status being the same or different from the commanded status [col. 5, lines 34-56, "Means 20 for generating...gallons per minute."].

43. As for claims 37-39, McLeish discloses the interface in claim 6, wherein one of said first and second device comprises an actuator and the other of said first and second device comprise a sensor [col. 5, lines 25-68, "The input-output device...base and the span."].

44. As for claims 40 and 41, McLeish discloses the interface in claim 6, wherein said interface further comprising input current detection means for directly detecting a sensor current rather than detecting sensor voltage determine sensor state to thereby reduce the effects of induced electrical noise appearing on sensor voltage on conductors coupling said sensor to said interface [col. 4, lines 30-55, "A field device...referred to above."; col. 5, lines 25-68, "The input-output device...base and the span."].

45. As for claim 42, McLeish discloses the interface in claim 6, wherein:

said interface is a comprehensive universal configurable interface for interfacing a multiplicity of analog, digital, voltage, and current based signals over a multiple orders of magnitude signal range between a controller and a transducer [col. 4, lines 30-55, "A field device...referred to above."];

said first external device comprises either a sensor or an actuator of a machine or process [col. 5, lines 25-68, "The input-output device...base and the span."];

said first external device comprises a sensor generating a voltage or a current signal [col. 5, lines 25-68, "The input-output device...base and the span."];

said second device comprises a controller and an isolation circuit interposed between said interface and said external controller [col. 3, lines 64-66, "Each MP 3...input output device 2."; col. 5, lines 49-58, "The signal conditioning...of keyboard 10."];

said second port includes a third terminal for communicating at least one of data, control or commands, and clock [col. 4, lines 30-55, "A field device...referred to above."];

said operating circuit includes a plurality of different operating mode circuits, and said operating circuit includes means for configuring said operating circuit to operate in a particular mode of operation [col. 4, lines 9-22, "The input-output device...also be utilized."; col. 5, lines 25-68, "The input-output device...base and the span."];

said mode of operation comprises a digital input signal mode, a digital output signal mode, an analog input signal mode, an analog output signal mode, or combinations thereof [col. 4, lines 30-55, "A field device...referred to above."; col. 5, lines 25-68, "The input-output device...base and the span."];

said operation selector comprises a microcontroller coupled with at least one analog-to--digital converter for converting analog signals to digital signals for processing by said microcontroller [col. 1, lines 36-47, "Furthermore, U.S. Pat...and digital signals."];

said operation selector being operative to activate portions of said operating circuit and to deactivate other portions of said operating circuit to define an active circuit that performs a selected operation [col. 4, lines 30-55, "A field device...referred to above."; col. 5, lines 25-68, "The input-output device...base and the span."].

46. As for claim 43, McLeish discloses the interface in claim 6, wherein:

said operating circuit comprising a plurality of modular circuits each for performing a predetermined signal processing function with respect to input signals and output signals, and said operation selector being operative to activate ones of said modules and to deactivate other ones of said modules to define one or more active modules that performs a selected

operation [col. 4, lines 30-55, "A field device...referred to above."; col. 5, lines 25-68, "The input-output device...base and the span."];

said operation selector being operative to activate said modules to process a signal of a particular signal type [col. 4, lines 30-55, "A field device...referred to above."; col. 5, lines 25-68, "The input-output device...base and the span."];

said interface further comprising input current detection means for directly detecting a sensor current rather than detecting sensor voltage determine sensor state to thereby reduce the effects of induced electrical noise appearing on sensor voltage on conductors coupling said sensor to said interface [col. 4, lines 30-55, "A field device...referred to above."; col. 5, lines 25-68, "The input-output device...base and the span."].

47. As for claims 53 and 55, McLeish discloses the interface in claim 6, wherein said interface further comprising a protection circuit for reducing damage to said interface or to said first device or said second device that would otherwise result in damage to said interface as a result of misconnecting or miswiring said interface to one of said first or second external devices [col. 4, lines 49-58, "The signal conditioning...of keyboard 10."].

48. As for claims 58 and 59, McLeish discloses the interface in claim 55, wherein said interface further comprising input current detection means for directly detecting a sensor current rather than detecting sensor voltage determine sensor state to thereby reduce the effects of induced electrical noise appearing on sensor voltage on conductors coupling said sensor to said interface [col. 4, lines 30-55, "A field device...referred to above."; col. 5, lines 25-68, "The input-output device...base and the span."].

49. As for claims 60 and 62, McLeish discloses the interface in claim 6, wherein said interface further comprising means for measuring power, both real and imaginary, by dynamically switching between voltage measurements and current measurements [col. 5, lines 25-68, "The input-output device...base and the span."].

50. As for claim 61, McLeish discloses the interface in claim 6, wherein said interface further comprising: a voltage measuring circuit and a current measurement circuit each coupleable to a load, a switching circuit for dynamically switching between said voltage measurement circuit and said current measurement circuit; said combination of voltage measurements and said current measurements permitting measurement of power consumed by said load [col. 5, lines 25-68, "The input-output device...base and the span."].

51. As for claim 79, McLeish discloses the interface in claim 6, wherein said interface is formed as a single integrated device within a common enclosure [input-output device 2, Fig. 2].

52. As for claim 81, McLeish discloses the interface in claim 6, wherein said selectable operation of said interface to inter-operate with a plurality of different sensors, actuators, and other transducers materially reducing design and engineering time associated with designing, assembling, and debugging operation of a system including said interface [col. 2, lines 1-14, "Present digital...or output signals."].

53. As for claim 44, McLeish discloses an electrical input and output (I/O) interface comprising:

a first port for coupling said interface to a first external device [col. 4, lines 30-34, "A field device 4...or field device 4."];

a second port for coupling said interface with a second device [col. 4, lines 30-34, "A field device 4...or field device 4."]; and

an operating circuit communicating with a first signal set at said first port and communicating a second signal set at said second port and performing an operation on one of said first signal set and said second signal set as an input and generating the other one of said first signal set and said second signal set as an output [col. 4, lines 30-58, "A field device 4...of keyboard 10."; col. 5, lines 25-28, "The input-output device...referred to above."];

said operating circuit receiving an input from an external micro-controller directing a configuration of said operating circuit [col. 3, lines 64-66, "Each MP 3 is...input output device 2."].

McLeish does not specifically disclose a first port having only first and second terminals for exclusively coupling an interface to a first external device. Sitte teaches a sensor having two terminals [col. 1, lines 39-54, "U.S. Pat No....over a wide range."]. Such a sensor would inherently be coupled to a control circuit through only two terminals (e.g. first and second terminals). Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to modify McLiesh providing a first port with only first and second terminals for exclusively coupling the interface to a first external device, because this would allow for coupling with a two-terminal sensor such as that disclosed by Sitte.

54. As for claim 49, McLeish discloses an interface comprising:

an output circuit that communicates an output command to an external device coupled with said interface commanding said external device to operate in a state corresponding to

said command [col. 3, line 67 – col. 2, line 3, "The input-output device...particularized herein."]; and

a monitor circuit that monitors the actual operating state of said external device [col. 5, lines 25-28, "The input-output device...4 referred to above."]; said actual operating state being the same or different from the commanded state [col. 6, lines 34-56, "Means 20 for generating...gallons per minute."].

McLeish does not specifically disclose a first port having only first and second terminals for exclusively coupling an interface to a first external device. Sitte teaches a sensor having two terminals [col. 1, lines 39-54, "U.S. Pat No....over a wide range."]. Such a sensor would inherently be coupled to a control circuit through only two terminals (e.g. first and second terminals). Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to modify McLiesh providing a first port with only first and second terminals for exclusively coupling the interface to a first external device, because this would allow for coupling with a two-terminal sensor such as that disclosed by Sitte.

55. As for claim 50, McLeish discloses the interface circuit in claim 49, wherein said actual operating state is different from the commanded state [col. 6, lines 34-56, "Means 20 for generating...gallons per minute."].

56. As for claim 51, McLeish discloses the interface in claim 49, wherein said state corresponds to a status [col. 5, lines 25-28, "The input-output device...4 referred to above."].

57. **Claims 66-72, 76-78 and 82** are rejected under 35 U.S.C. 103(a) as being obvious over McLeish in view of Sitte and in further view of Campau et al (US 6,206,482) (hereinafter Campau).

58. As for claims 66 and 68, McLeish discloses the use of signal conditioning circuitry which, as known to those skilled in the art, may include a constant current circuit [col. 4, lines 48-58, "The signal conditioning...of keyboard 10."]. However, neither McLeish nor Sitte specifically disclose providing a constant current control circuit for controlling a current drawn by a load device. Campau teaches providing a constant current control circuit for controlling a current drawn by a load device, including a solenoid actuated valve [col. 2, line 58 – col. 3, line 7, "In prior art systems...the valve heating."].

It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the teachings of McLeish and Sitte by adding a constant current control circuit for controlling a current drawn by a load device, in order to open or close a valve, as taught by Campau [col. 2, line 58 – col. 3, line 7, "In prior art systems...the valve heating."].

59. As for claim 67, McLeish discloses the interface of claim 66, said load device including a power level actuator in a process or machine [col. 9, lines 3-10, "The input output device...data acquisition systems."].

60. As for claim 69, McLeish discloses the interface of claim 66, wherein said load device including an inductive load component, said constant current circuit being operative to reduce electromagnetic interference (EMI) and RFA (radio frequency interference) caused by energizing or de-energizing said load device [col. 9, lines 3-10, "The input output device...data acquisition systems."].

61. As for claim 70, McLeish discloses the interface of claim 66, wherein said load device including a relay device [col. 9, lines 3-10, "The input output device...data acquisition systems."].

62. As for claim 71, McLeish discloses the interface of claim 66, wherein said load device including a solenoid valve device [col. 9, lines 3-10, "The input output device...data acquisition systems."].

63. As for claim 72, McLeish discloses the interface of claim 66, wherein said constant current circuit eliminating the need for 10 suppression circuits to suppress turn-on and turn-off mechanical shock to electromechanical devices and inductive loads [col. 9, lines 3-10, "The input output device...data acquisition systems."].

64. As for claim 76, McLeish discloses the interface of claim 66, wherein said load device including an inductive load component, 25 and said constant current circuit reducing destructive effects, both human and mechanical, of inductive L(di/dt) based transients that occur when de-energizing inductive loads [col. 9, lines 3-10, "The input output device...data acquisition systems."].

65. As for claim 82, McLeish discloses the interface of claim 76, wherein said destructive effects include destructive mechanical effects to said inductive load containing device [col. 9, lines 3-10, "The input output device...data acquisition systems."].

66. As for claim 77, McLeish discloses the interface of claim 77, wherein said destructive effects include destructive effects on humans in the vicinity of said inductive load containing device [inherent].

67. As for claim 78, McLeish discloses the interface of claim 66, wherein said load device includes or couples with a triac controlled by a triac control circuit, and said constant current circuit reduces half-cycle time delay in energizing and de-energizing current (ac) loads that

otherwise occur with triac control circuits [col. 9, lines 3-10, "The input output device...data acquisition systems."].

68. **Claims 73-75** are rejected under 35 U.S.C. 103(a) as being obvious over McLeish in view of Sitte in further view of Campau and in further view of Thomas et al (US 4,267,439) (hereinafter Thomas).

69. As for claims 73-75, neither McLeish nor Sitte specifically disclose the use of an incandescent lamp in conjunction with a constant current circuit. Thomas discloses the use of an incandescent lamp in conjunction with a constant current circuit [abstract, "Incandescent lamps are...operational lamp circuit."]. It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the teachings of McLeish, Sitte and Campau by providing a constant current from a constant current circuit to an incandescent lamp, in order to extend the usable life of a controlled incandescent lamp, as taught by Thomas [abstract, "Incandescent lamps are...operational lamp circuit."].

70. **Claim 80** is rejected under 35 U.S.C. 103(a) as being obvious over McLeish in view of Sitte and in further view of Galecki et al (US 6,308,231) (hereinafter Galecki).

As for claim 80, neither McLeish nor Sitte specifically teach forming the interface on a single printed circuit substrate. Galecki teaches forming an I/O interface on a single printed circuit substrate [abstract, "According to another aspect, an integrated circuit... communication interface."]. It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the teachings of McLeish and Sitte by forming the interface on a single printed circuit substrate, in order to simplify fabrication of the device.

Conclusion

71. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. The following references provide further examples of two-terminal sensors or actuators. Note that all of the sensors/actuators may be used in conjunction with a controller. US 4,374,333; US 6,334,352 B1; US 4,638,850; US 4,480,312; US 5,793,993.

72. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Aaron Perez-Daple whose telephone number is 703-305-4897. The examiner can normally be reached on 9am - 6pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Anil Khatri can be reached on 703-305-0282. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

2/6/04

Aaron Perez-Daple

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Art Unit - 2121